OVERVIEW OF ASHRAE 62.2-2010 VENTILATION STANDARD

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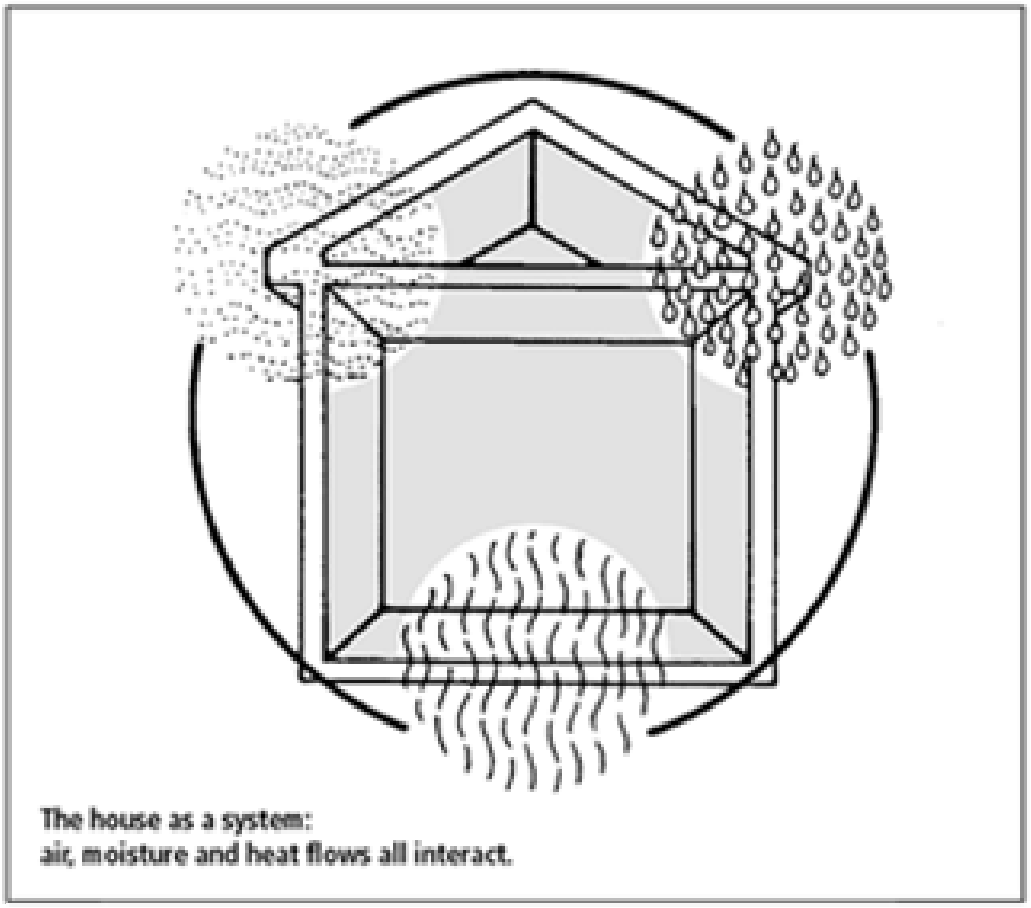
62.2 vs. Minnesota Energy Code 1322

- Your group ,utility ,agency may have adopted 62.2 2010
- This discussion is not the MN code that applies to new construction, we have had a mechanical ventilation code since 2000
- They are similar in nature but not the same
- Check with your local or state code /inspection personal to see what applies to your project

Building Science Basics

- Heat
- Air
- Moisture



The house as a system:
air, moisture and heat flows all interact.

Why Ventilate?

- People pollutants
  - human respiration (primarily CO_2), body odor, water vapor
- Building pollutants
  - VOC,s, combustion gases, radon, water vapor
- Activity pollutants
  - VOC's, water vapor, odors

Goals of Mechanical Ventilation

- To provide an efficient exchange of air
  - system design, specification and installation
- To control moisture
  - identification of sources
- To provide improved indoor air quality
  - collection, removal and replacement of air

Condensation

- LIFESTYLE ?
- VENTILATION ?
- HUMMIDIFIER OPERATION ?
- TEMP. OUTSIDE AND INSIDE ?
- RH% RELATIVE HUMIDITY?

Section 1- Purpose

1. Defines the roles of the minimum requirement for mechanical and natural ventilation systems
2. Intended to provide acceptable indoor air quality in low rise residential buildings

Section 2- Scope

Type of Building
Section 2

- All residential spaces for human occupancy
- Single family houses
- Multi family up to 3 stories
- Key word is intended for human occupancy

The Standard and Residential Spaces Section 2

Covered space that people normally enter include:

- Living rooms
- Bedrooms
- Kitchens
- Bathrooms
- Hallways
- Closets
- Store rooms
- Laundries
- Basement

Standard and Residential Spaces

Other spaces within the building are not covered, these areas are listed below:

- Attics
- Crawl spaces

*NOTE: These spaces are not included in the ventilation calculation.

Section 3- Definitions

ASHREA Standard 62.2 -2010

- Section 3 of the actual standard has definitions not the user guide

Methods of Ventilation

- Continuous: Sometimes referred to as general, central, or whole-house ventilation. Should be quiet ,low volume, and simple to operate.
- Intermittent: Sometimes referred to as spot, local, or source point ventilation. Commonly used in bathroom, kitchen, laundry, hobby, and home office. Should remove excessive moisture and pollutants quickly.

Ideally, an airtight home designed with both continuous and intermittent ventilation will contribute to a healthy and comfortable living environment for the entire family.

Section 4 Whole – Building Ventilation

Index for Section 4

- 4.1 VENTILATION RATE
- 4.1.1 DIFFERENT OCCUPANT DENSITY
- 4.1.3 INFILTRATION CREDIT
- 4.2 SYSTEM TYPES
- 4.3 AIRFLOW MEASUREMENT
- 4.4 CONTROL AND OPERATION
- 4.5 DELIVERED VENTILATION
- 4.6.2 VERY COLD CLIMATES

How to Measure the Floor Area

- The standard is silent on how the floor area is measured, here is a few ideas
  1. Measure outside of house (higher air flow)
  2. Measure inside of house including hallways and closets (lower airflow)
  3. Areas that are conditioned and intended for human occupancy, including basements
  4. Not including attics or crawl spaces
  5. The listing that a realtor uses when home is for sale

Example Floor Area

Determination of floor area

Q: An existing story and a half house that has a conditioned upper level and a basement that has one heat supply in it. Does the basement need to be included in the ventilation calculation?

A: Yes. Basements are considered occupiable and conditioned.

Ventilation Sizing Formula
Ventilation Rate 4.1

- CFM =0.01 x Floor area + 7.5(number of bedrooms +1) OR
- CFM= Floor area/100 + (number of Bedrooms + 1) x 7.5
- The standard requires 7.5 cfm per occupant, plus 0.01 cfm per square foot of floor area (1 cfm per 100 square ft)

Standard Sizing Table

TABLE 4.1 (I-P) Ventilation Air Requirements,cfm

Floor Area (ft2)	Bedrooms				
	<2	2-3	4-5	6-7	>7
<1500	30	45	60	75	90
1501-3000	45	60	75	90	105
3001-4500	60	75	90	105	120
4501-6000	75	90	105	120	135
6001-7500	90	105	120	135	150
>7500	105	120	135	150	165

This chart came out of ASHRAE Standard 62.2-2012 User's Manual

DIFFERENT OCCUPANT DENSITY 4.1.1

- The standard assumes that two people will be in the first bedroom
- That one person will be in each additional bedroom
- If the actual occupancy is known and is higher then the standard the ventilation rate must add (7.5 cfm per person)
- If there is fewer people then bedroom count you still need to meet the standard

Example Occupant Density 4.1.1

4.1.1 Different Occupant Density

Q: The house that I have audited has 1627 sq. ft. and has two bedrooms. There are four occupants. What is the whole building ventilation rate?

A: The default ventilation rate would be, 1627 sq. ft. x 0.01 cfm + (2+1) x 7.5 cfm, but there are four people so 7.5 cfm would have to be added

Infiltration Credit 4.1.3

- The purpose is to allow a reduction in the required ventilation rate
- The ventilation standard assumes in addition to the mechanical ventilation an infiltration rate of 2 cfm per 100 of floor space
- This is based on a fairly tight house, attention to detail with air sealing

Building Leakage Test

Test Results

1. Airflow at 50 Pascals: (50 Pa = 0.2 w.c.)		1383 CFM, 8.09 ACH 1.04 CFM per ft2 floor area
2. Leakage Areas:		142.8 in2 Canadian EqLA @ 10 Pa 75.9 in2 LBL ELA @ 4 Pa
3. Minneapolis Leakage Ratio:		0.00 CFM50 per ft2 surface area
4. Building Leakage Curve:		Flow Coefficient (C) = 108.7 Exponent (n) = 0.650 (Assumed)
5. Test Settings:		Test Standard: = CGSB Test Mode: = Depressurization Equipment = Model 3 Minneapolis Blower Door

Infiltration Estimates

1. Estimated Average Annual Infiltration Rate:		65.9 CFM 0.39 ACH 22.0 CFM per person
2. Estimated Design Infiltration Rate:	Winter:	102.0 CFM 0.60 ACH
	Summer:	55.6 CFM 0.33 ACH
3. Recommended Whole Building Mechanical Ventilation Rate: (based on ASHRAE 62.2)		16.0 CFM

Cost Estimates

1. Estimated Cost of Air Leakage for Heating:
2. Estimated Cost of Air Leakage for Cooling:

Infiltration Credit 4.1.3

- If the house has been tested and has a high infiltration rate, then the required mechanical rate can be reduced
- The reduction is one - half the difference between the measured infiltration and the default infiltration
- The calculation is as follows CFM = CFM from the table (4.1) -.5 x (Measured Infiltration in CFM/sq. ft – 0.02 cfm/sq. ft) x floor area sq ft

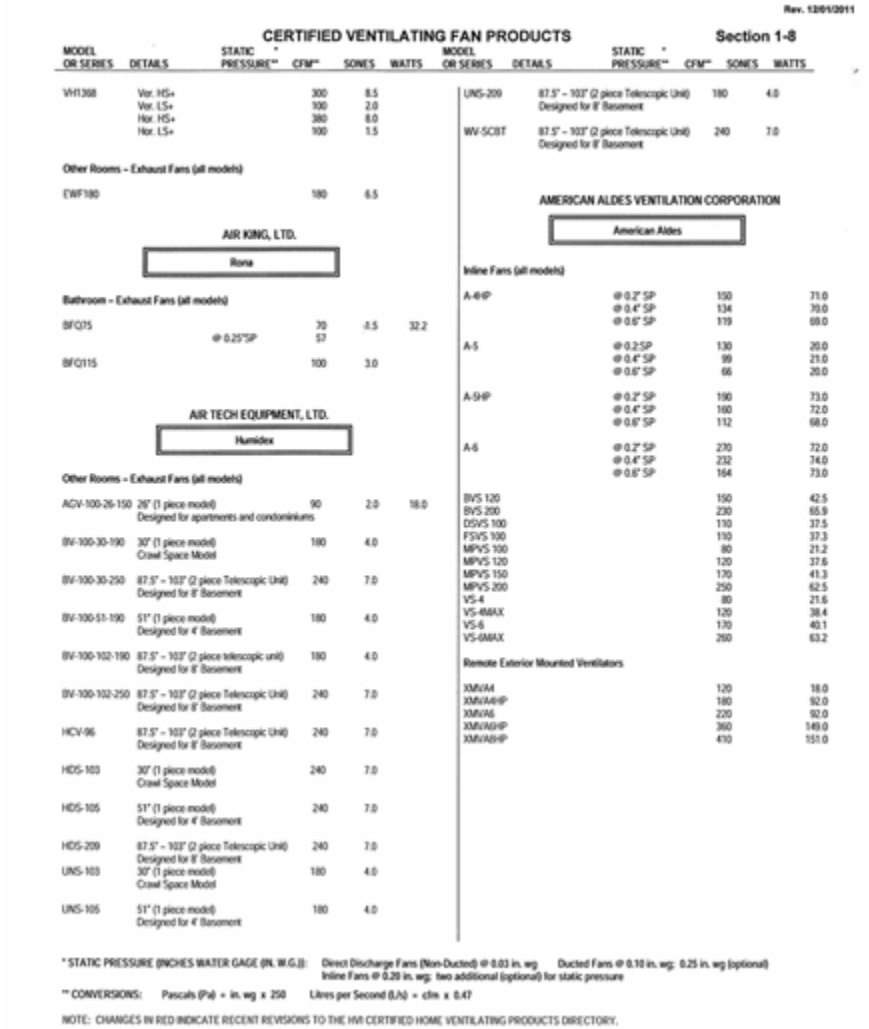
System Type
4.2

- The ventilation system is intended to provide adequate mechanical ventilation whenever the home is occupiable.
- This means system must be capable of providing desired ventilation 24 hours a day, 365 days a year

System Type
4.2

- The ventilation system can be
  1. Exhaust only
  2. Supply only
  3. A combination of supply and exhaust, this may or may not include a heat and/or energy recovery ventilator

Listing in HVI



Rev. 12/01/2011

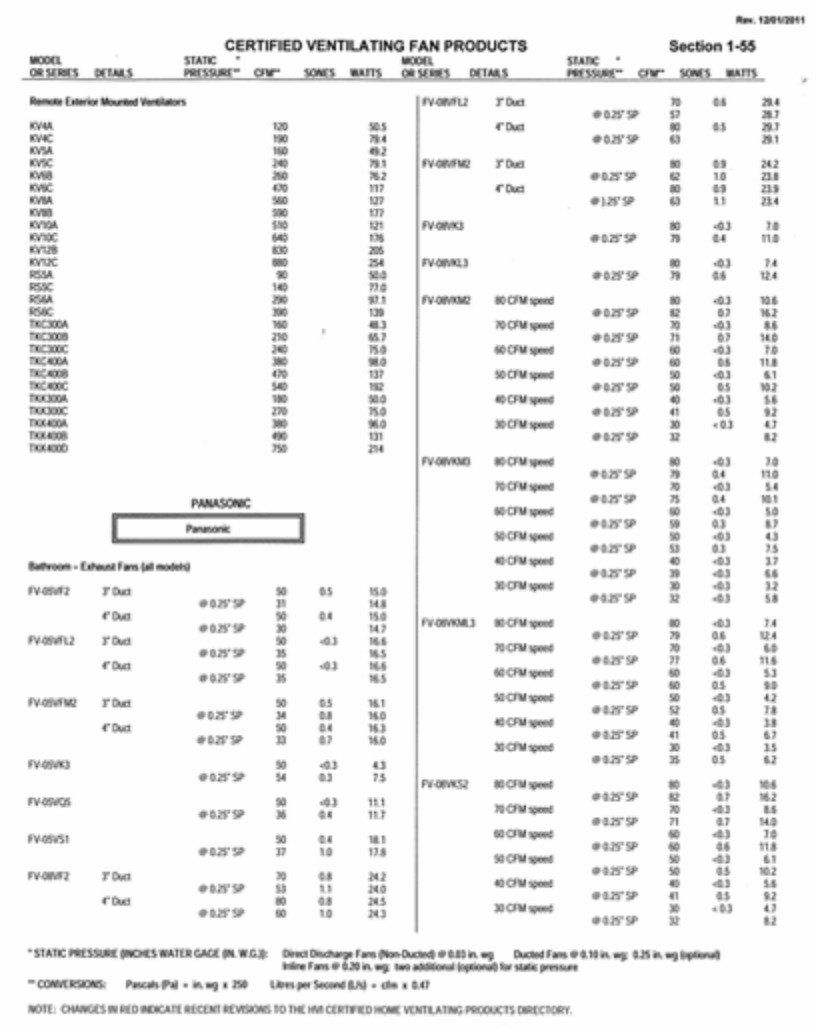
CERTIFIED VENTILATING FAN PRODUCTS — Section 1-8

MODEL OR SERIES	DETAILS	STATIC PRESSURE*	CFM**	SONES	WATTS
VH1368	Ver. HS+		300	8.5	
	Ver. LS+		100	2.0	
	Hor. HS+		380	8.0	
	Hor. LS+		100	1.5	
Other Rooms – Exhaust Fans (all models)					
EWF180			180	6.5	
AIR KING, LTD.					
Rona					
Bathroom – Exhaust Fans (all models)					
BFQ75			70	0.5	32.2
		@ 0.25"SP	57		
BFQ115			100	3.0	
AIR TECH EQUIPMENT, LTD.					
Humidex					
Other Rooms – Exhaust Fans (all models)					
AGV-100-26-150	26" (1 piece model) Designed for apartments and condominiums		90	2.0	16.0
BV-100-30-190	30" (1 piece model) Crawl Space Model		180	4.0	
BV-100-30-250	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		240	7.0	
BV-100-51-190	51" (1 piece model) Designed for 4' Basement		180	4.0	
BV-100-102-190	87.5" – 103" (2 piece telescopic unit) Designed for 8' Basement		180	4.0	
BV-100-102-250	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		240	7.0	
HCV-96	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		240	7.0	
HDS-103	30" (1 piece model) Crawl Space Model		240	7.0	
HDS-105	51" (1 piece model) Designed for 4' Basement		240	7.0	
HDS-209	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		240	7.0	
UNS-103	30" (1 piece model) Crawl Space Model		180	4.0	
UNS-105	51" (1 piece model) Designed for 4' Basement		180	4.0	
UNS-209	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		180	4.0	
WV-SCBT	87.5" – 103" (2 piece Telescopic Unit) Designed for 8' Basement		240	7.0	
AMERICAN ALDES VENTILATION CORPORATION					
American Aldes					
Inline Fans (all models)					
A-4HP		@ 0.2" SP	150		71.0
		@ 0.4" SP	134		70.0
		@ 0.6" SP	119		69.0
A-5		@ 0.2 SP	130		20.0
		@ 0.4" SP	99		21.0
		@ 0.6" SP	66		20.0
A-5HP		@ 0.2" SP	190		73.0
		@ 0.4" SP	160		72.0
		@ 0.6" SP	112		68.0
A-6		@ 0.2" SP	270		72.0
		@ 0.4" SP	232		74.0
		@ 0.6" SP	164		73.0
BVS 120			150		42.5
BVS 200			230		65.9
DSVS 100			110		37.5
FSVS 100			110		37.3
MPVS 100			80		21.2
MPVS 120			120		37.6
MPVS 150			170		41.3
MPVS 200			250		62.5
VS-4			80		21.6
VS-4MAX			120		38.4
VS-6			170		40.1
VS-6MAX			260		63.2
Remote Exterior Mounted Ventilators					
XMVA4			120		18.0
XMVA4HP			180		92.0
XMVA6			220		92.0
XMVA6HP			360		149.0
XMVA8HP			410		151.0

* STATIC PRESSURE (INCHES WATER GAGE (IN. W.G.)): Direct Discharge Fans (Non-Ducted) @ 0.03 in. wg Ducted Fans @ 0.10 in. wg: 0.25 in. wg (optional) Inline Fans @ 0.20 in. wg: two additional (optional) for static pressure

** CONVERSIONS: Pascals (Pa) ÷ in. wg x 250 Litres per Second (L/s) = cfm x 0.47

NOTE: CHANGES IN RED INDICATE RECENT REVISIONS TO THE HVI CERTIFIED HOME VENTILATING PRODUCTS DIRECTORY.



Rev. 12/01/2011

CERTIFIED VENTILATING FAN PRODUCTS — Section 1-55

MODEL OR SERIES	DETAILS	STATIC PRESSURE*	CFM**	SONES	WATTS
Remote Exterior Mounted Ventilators					
KV4A			120		50.5
KV4C			190		79.4
KV5A			160		49.2
KV5C			240		79.1
KV6B			260		76.2
KV6C			470		117
KV8A			560		127
KV8B			590		177
KV10A			510		121
KV10C			640		176
KV12B			830		205
KV12C			880		254
RS5A			90		50.0
RS5C			140		77.0
RS6A			290		97.1
RS6C			390		139
TKIC300A			160		48.3
TKIC300B			210		65.7
TKIC300C			240		75.0
TKIC400A			380		98.0
TKIC400B			470		137
TKIC400C			540		192
TKIK300A			180		50.0
TKIK300C			270		75.0
TKIK400A			380		96.0
TKIK400B			490		131
TKIK400D			750		214
PANASONIC					
Panasonic					
Bathroom – Exhaust Fans (all models)					
FV-05VF2	3" Duct		50	0.5	15.0
		@ 0.25" SP	31		14.8
	4" Duct		50	0.4	15.0
		@ 0.25" SP	30		14.7
FV-05VFL2	3" Duct		50	<0.3	16.6
		@ 0.25" SP	35		16.5
	4" Duct		50	<0.3	16.6
		@ 0.25" SP	35		16.5
FV-05VFM2	3" Duct		50	0.5	16.1
		@ 0.25" SP	34	0.8	16.0
	4" Duct		50	0.4	16.3
		@ 0.25" SP	33	0.7	16.0
FV-05VK3			50	<0.3	4.3
		@ 0.25" SP	54	0.3	7.5
FV-05VQ5			50	<0.3	11.1
		@ 0.25" SP	36	0.4	11.7
FV-05VS1			50	0.4	18.1
		@ 0.25" SP	37	1.0	17.8
FV-08VF2	3" Duct		70	0.8	24.2
		@ 0.25" SP	53	1.1	24.0
	4" Duct		80	0.8	24.5
		@ 0.25" SP	60	1.0	24.3
FV-08VFL2	3" Duct		70	0.6	29.4
		@ 0.25" SP	57		28.7
	4" Duct		80	0.5	29.7
		@ 0.25" SP	63		29.1
FV-08VFM2	3" Duct		80	0.9	24.2
		@ 0.25" SP	62	1.0	23.8
	4" Duct		80	0.9	23.9
		@ 0.25" SP	63	1.1	23.4
FV-08VK3			80	<0.3	7.0
		@ 0.25" SP	79	0.4	11.0
FV-08VKL3			80	<0.3	7.4
		@ 0.25" SP	79	0.6	12.4
FV-08VKM2	80 CFM speed		80	<0.3	10.6
		@ 0.25" SP	82	0.7	16.2
	70 CFM speed		70	<0.3	8.6
		@ 0.25" SP	71	0.7	14.0
	60 CFM speed		60	<0.3	7.0
		@ 0.25" SP	60	0.6	11.8
	50 CFM speed		50	<0.3	6.1
		@ 0.25" SP	50	0.5	10.2
	40 CFM speed		40	<0.3	5.6
		@ 0.25" SP	41	0.5	9.2
	30 CFM speed		30	< 0.3	4.7
		@ 0.25" SP	32		8.2
FV-08VKM3	80 CFM speed		80	<0.3	7.0
		@ 0.25" SP	79	0.4	11.0
	70 CFM speed		70	<0.3	5.4
		@ 0.25" SP	75	0.4	10.1
	60 CFM speed		60	<0.3	5.0
		@ 0.25" SP	59	0.3	8.7
	50 CFM speed		50	<0.3	4.3
		@ 0.25" SP	53	0.3	7.5
	40 CFM speed		40	<0.3	3.7
		@ 0.25" SP	39	<0.3	6.6
	30 CFM speed		30	<0.3	3.2
		@ 0.25" SP	32	<0.3	5.8
FV-08VKML3	80 CFM speed		80	<0.3	7.4
		@ 0.25" SP	79	0.6	12.4
	70 CFM speed		70	<0.3	6.0
		@ 0.25" SP	77	0.6	11.6
	60 CFM speed		60	<0.3	5.3
		@ 0.25" SP	60	0.5	9.0
	50 CFM speed		50	<0.3	4.2
		@ 0.25" SP	52	0.5	7.8
	40 CFM speed		40	<0.3	3.8
		@ 0.25" SP	41	0.5	6.7
	30 CFM speed		30	<0.3	3.5
		@ 0.25" SP	35	0.5	6.2
FV-08VKS2	80 CFM speed		80	<0.3	10.6
		@ 0.25" SP	82	0.7	16.2
	70 CFM speed		70	<0.3	8.6
		@ 0.25" SP	71	0.7	14.0
	60 CFM speed		60	<0.3	7.0
		@ 0.25" SP	60	0.6	11.8
	50 CFM speed		50	<0.3	6.1
		@ 0.25" SP	50	0.5	10.2
	40 CFM speed		40	<0.3	5.6
		@ 0.25" SP	41	0.5	9.2
	30 CFM speed		30	< 0.3	4.7
		@ 0.25" SP	32		8.2

* STATIC PRESSURE (INCHES WATER GAGE (IN. W.G.)): Direct Discharge Fans (Non-Ducted) @ 0.03 in. wg Ducted Fans @ 0.10 in. wg: 0.25 in. wg (optional) Inline Fans @ 0.20 in. wg: two additional (optional) for static pressure

** CONVERSIONS: Pascals (Pa) ÷ in. wg x 250 Litres per Second (L/s) = cfm x 0.47

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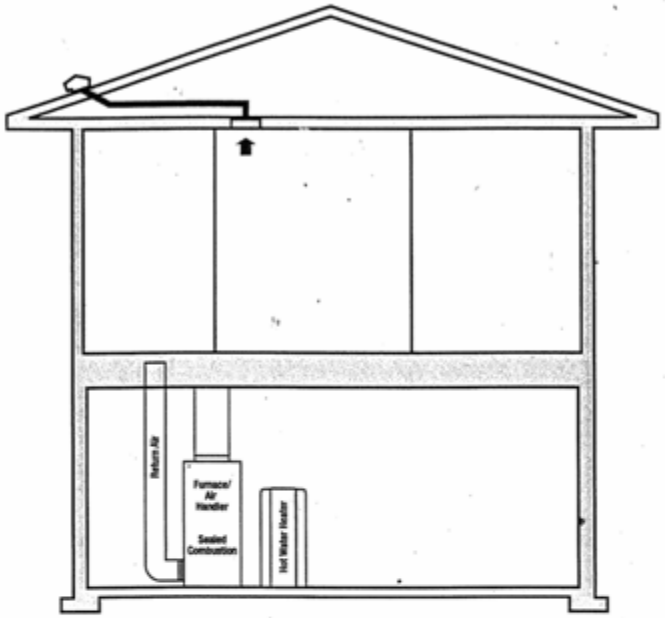
Equipment Selection

- BATH FANS
- KITCHEN HOODS
- INLINE FANS
- EXTERIOR MOUNTED FANS
- HRV/ERV

Exhaust Only

- Examples
    1. Surface mounted bath fan
    2. Remote mounted inline fan
    3. Exterior mounted fan
    4. Kitchen hood

Surface Fan Exhaust Only



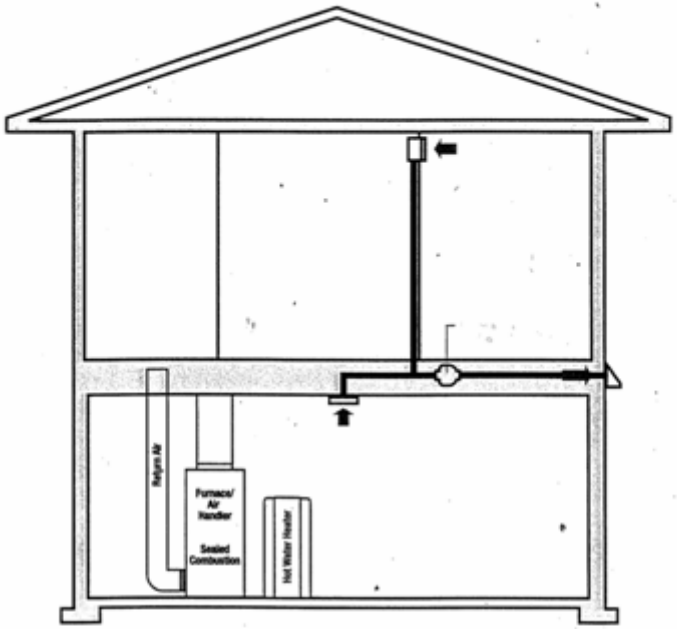
Benefits:

- Low cost
- Simple installation

Drawbacks:

- Fresh air comes from leaks in house
- Negative pressure issues
- Limited effectiveness in removing window condensation
- Uncomfortable drafts & leaks
- Little or no fresh air distribution without furnace blower operating

In-line Fan Exhaust Only



Benefits:

- Moderate cost
- Helps reduce window condensation
- Can be upgraded to HRV/ERV ventilation systems

Drawbacks:

- Fresh air comes from leaks in house
- Negative pressure issues
- Uncomfortable drafts and leaks
- Little or no fresh air distribution without furnace blower operating

Hanging mount inline fan

Exterior Side Wall Fan

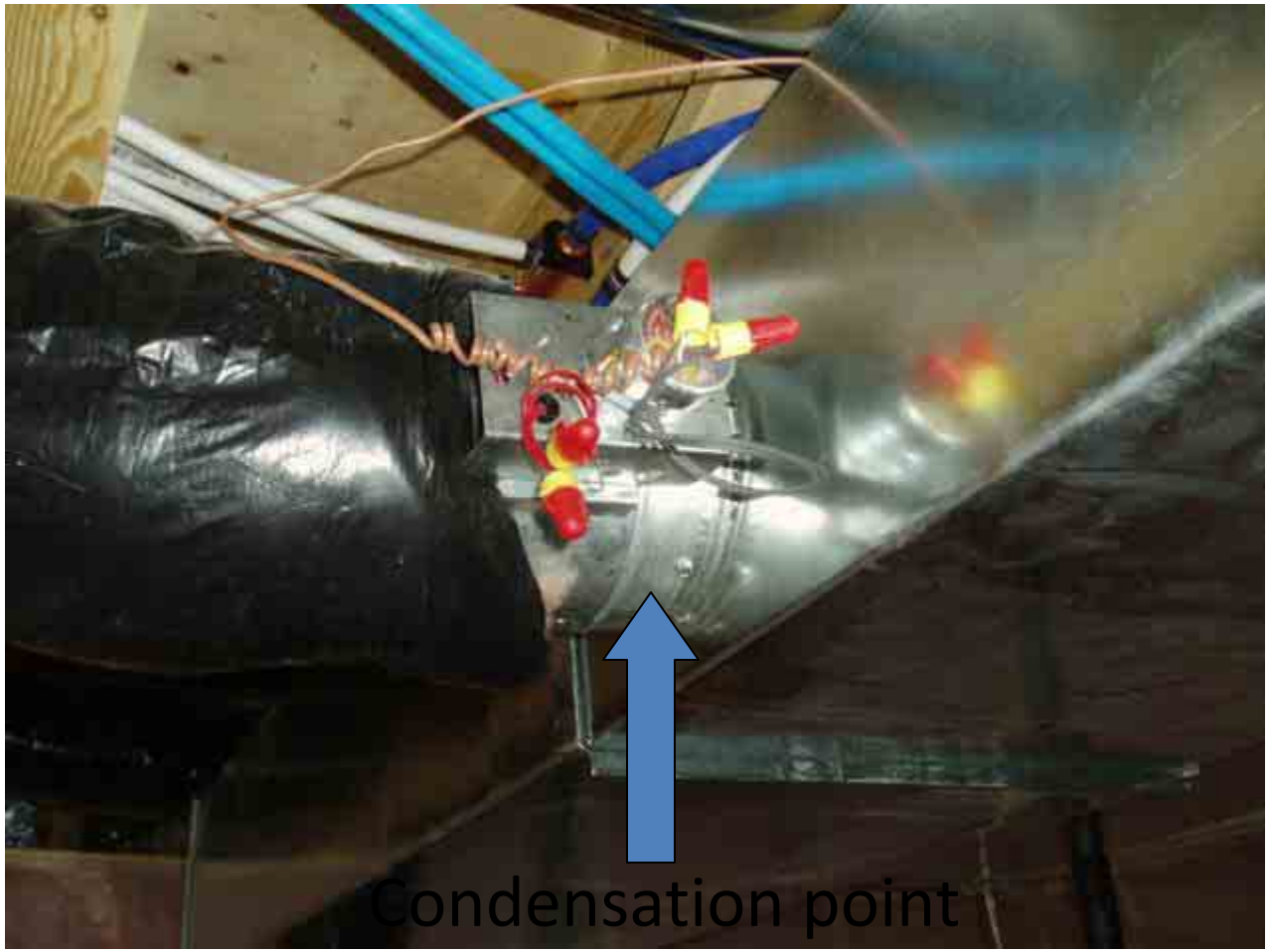
Kitchen hood

Supply Only

- Supply only ventilation in the northern climate is not very practical or common
- Various methods and installation types have been tried with poor results.
- Two installation types
  1. A duct could be hard connected to the return of an air handler (furnace)
  2. A dedicated supply fan could pull in outside air and supply it into the dwelling

Supply only ventilation

Outside air ducted into the return

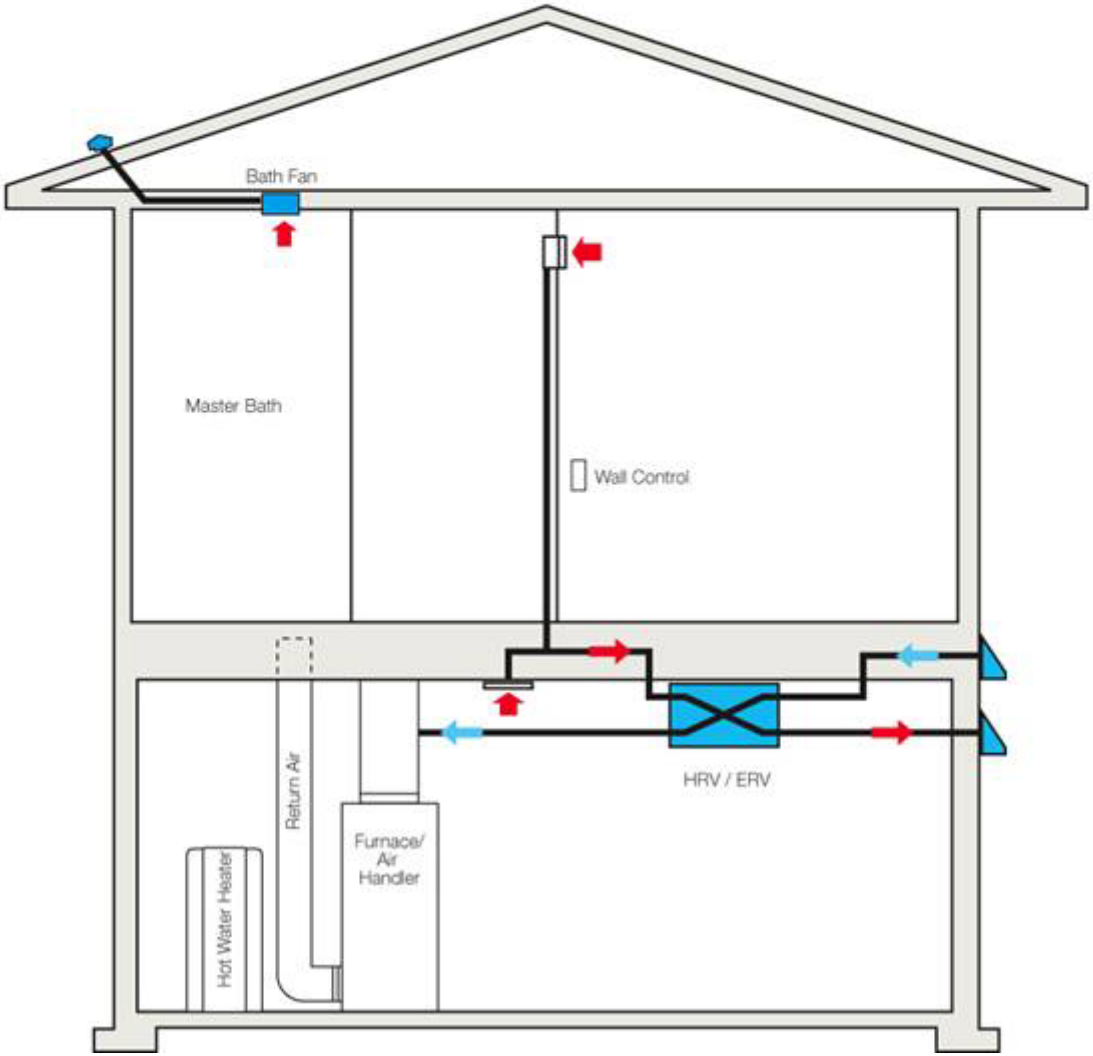


Supply Only … a lot of wiring

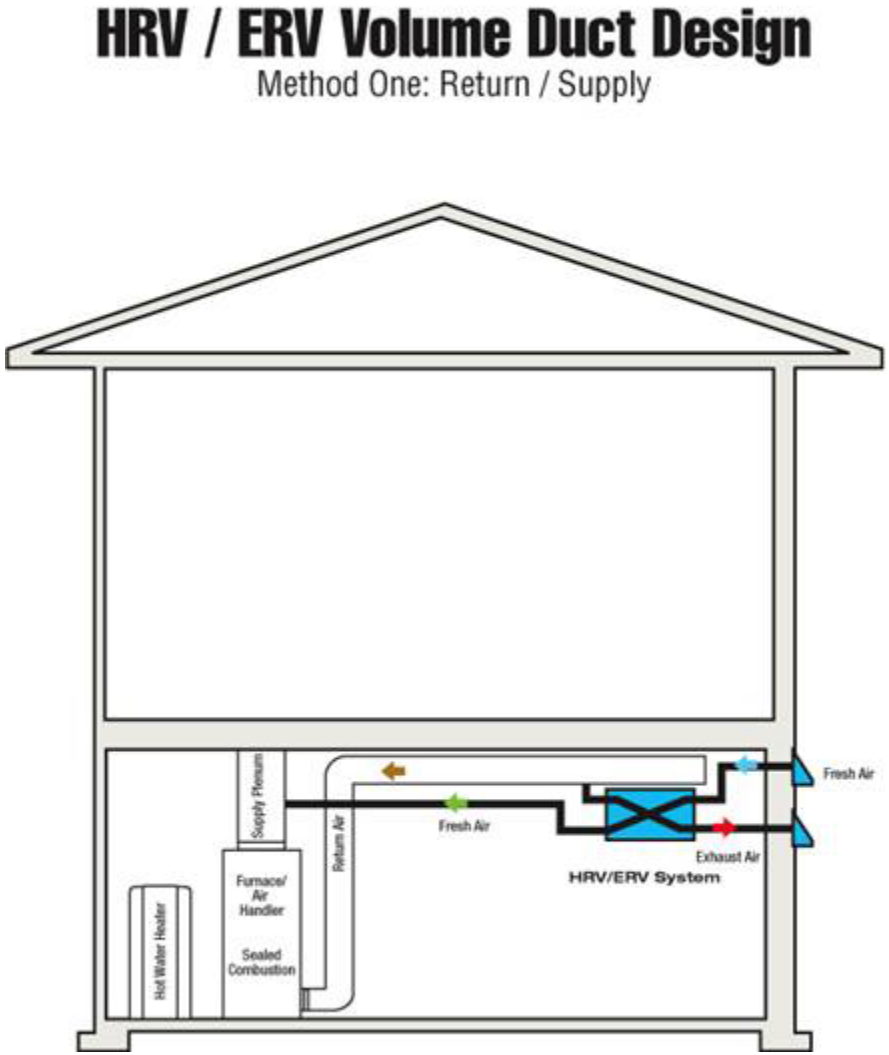
Combination Balanced Ventilation

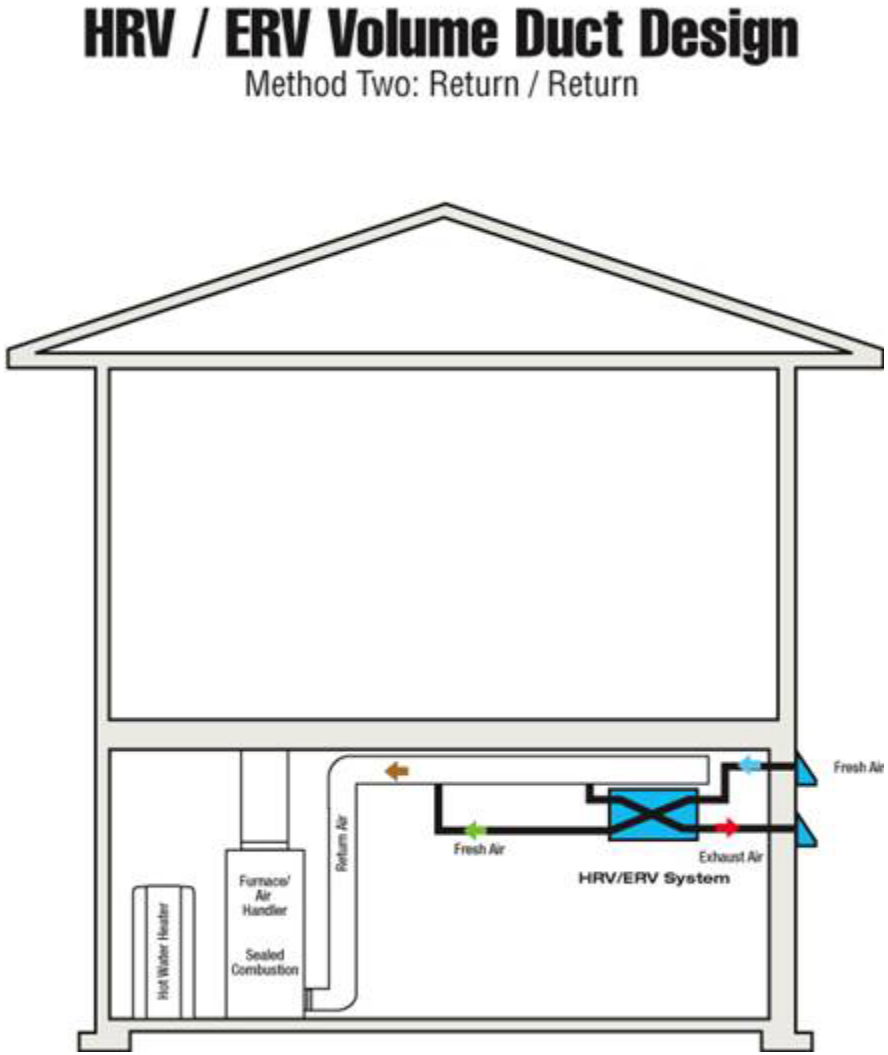
- A common and accepted ventilation system for northern climates is Heat Recovery Ventilation/Energy Recovery Ventilation
  1. These systems can do both whole building and local exhaust, depending unit and duct design
  2. These system have two air streams that are fairly equal, making the system “balanced” to avoid either pressurization or depressurization

General Ventilation
One-Story
HRV
(2) Hoods Ducted To The Outside



Balanced HRV / ERV





Small 100 cfm HRV

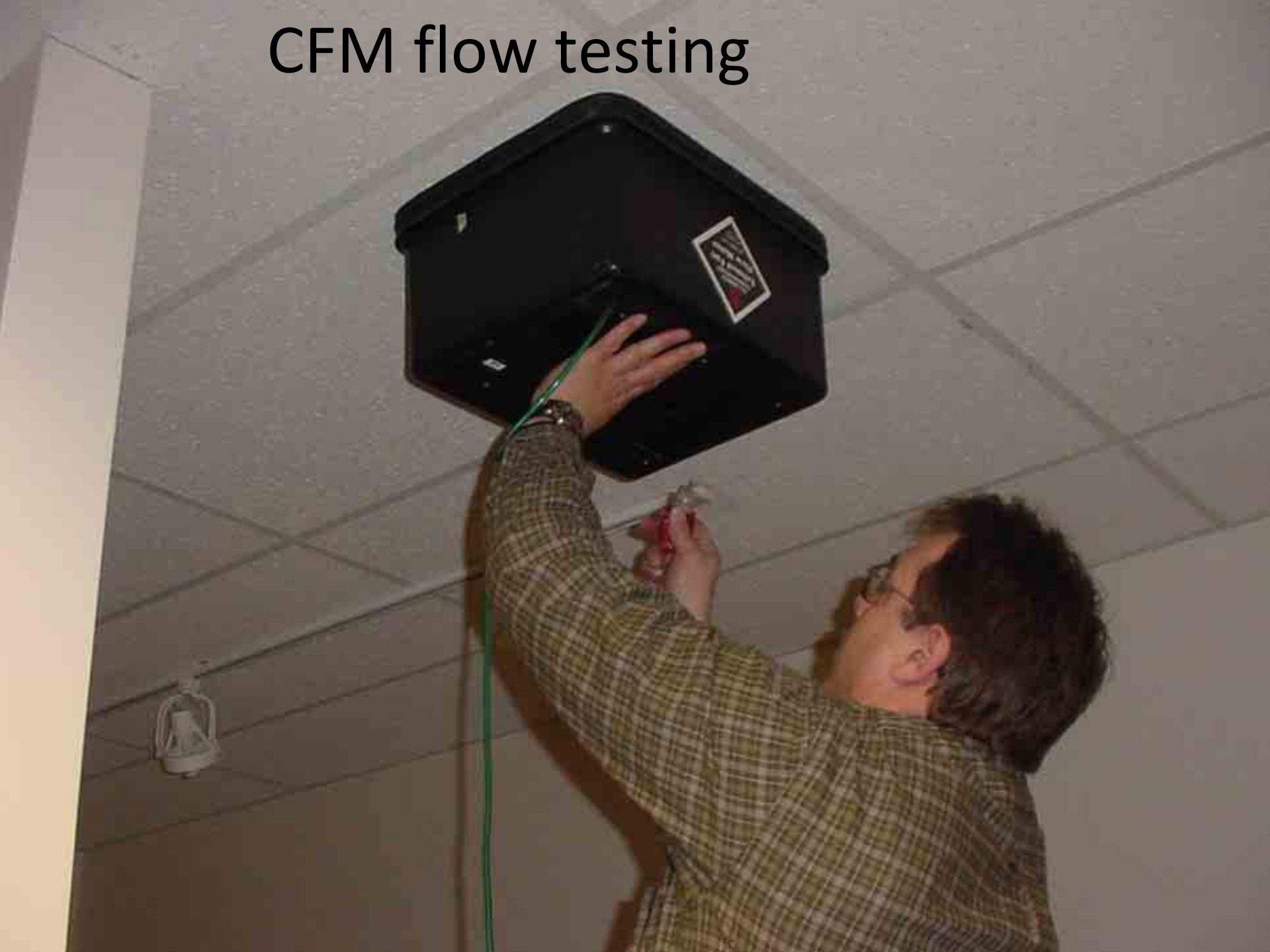
Combination Balanced Ventilation

- System designs that have been “balanced” ventilation in our climate **without** heat or energy recovery
  1. Have been tried with poor IAQ and thermal performance
  2. Difficult to wire and control
  3. Great Homeowner dissatisfaction

Airflow Measurement
4.3

- The standard requires that whole building ventilation be measured after installation to verify cfm of the installation
- This applies to all types of whole-building ventilation
- Verification does not apply to Local Exhaust in Section 5

CFM flow testing



CFM FLOW HOOD

BALANCED - HRV/ERV

Control and Operation
4.4

- Two main requirements
  1. System has an override control which is readily accessible to the occupant

     The occupant has the choice to operate the ventilation system or not
  2. Section 4.1 is the rate for continuously operating system. The exception to this is the system may run intermittently

Control and Operation
4.4

- Intermittent fan operation
    1. Air flow values from section 4.1 shall be provided during each hour of operation, implying that the ventilation system runs continuously
    2. The exception to this is that the system can run intermittently based on a timer, keep in mind when system runs it will be at a larger airflow to compensate for the “off – cycle” of the system
    3. This means that during a 24 hour period, the amount of air flow (cfm) would be the same regardless if the system ran continuously or intermittently

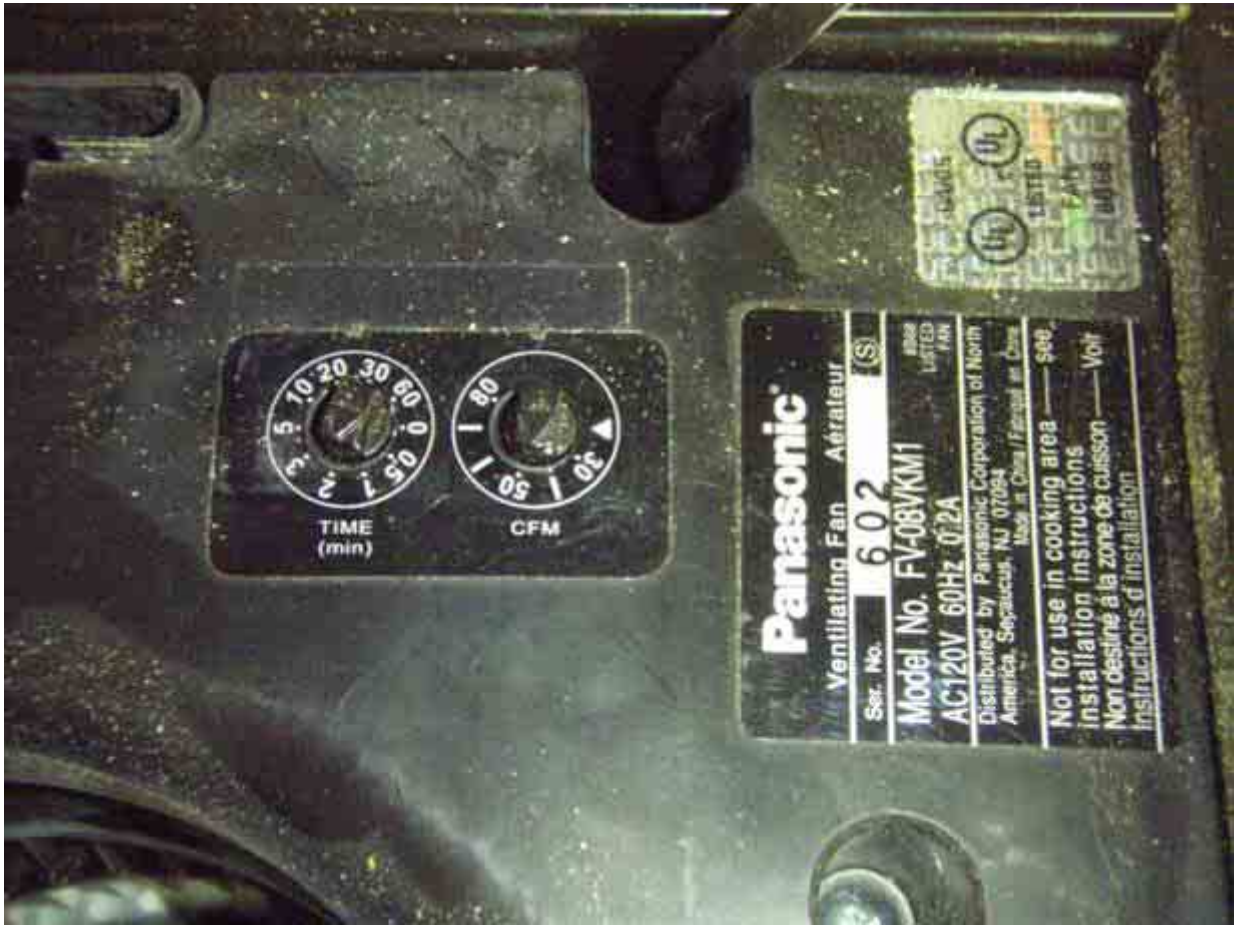
Example control option

4-G Control Options

Q: I plan to use a bathroom exhaust fan to provide the ventilation for a house. The fan is designed to be operated by a typical wall switch. Do I need to put a label on the wall plate to comply with the requirement that controls be "appropriately labeled"?

A: Yes. If the exhaust fan were serving only the local exhaust requirements for the bathroom, then a label would not be required. Since the fan is providing whole-building ventilation, a label is needed to inform the occupant of that.

Speed control and delay timer


TIME
(min)
CFM
Panasonic
Ventilating Fan Aérateur
Ser. No. 602
Model No. FV-08VKM1
AC120V 60Hz 0.2A
Distributed by Panasonic Corporation of North America, Secaucus, NJ 07094
Made in China / Fabriqué en Chine
Not for use in cooking area — see installation instructions
Non destiné à la zone de cuisson — Voir instructions d'installation

HRV/ERV Control

New Control Systems

- New easy to use programmable thermostats
  - Attractive
  - Easier to use
  - Programmable Fan
  - Circulate Fan Mode

Delivered Ventilation
4.5

- When using a combination ventilation (balanced) system, a HRV/ERV or dedicated supply/exhaust system, the ventilation rate is the larger of the two air streams
- The air flow rates cannot be added together to get credit for a higher ventilation rate

Very Cold Climates
4.6.2

- In northern climates, there is a limitation to supply only ventilation due to potential pressurization
  - The supply air flow into the dwelling cannot be greater then 7.5 cfm per 100 square feet of floor area

Section 5 Local Exhaust

Index for Section 5

- 5.1 LOCAL MECHANICAL EXHAUST
- 5.2 INTERMITTENT LOCAL EXHAUST
- 5.2.1 CONTROL AND OPERATION
- 5.2.2 VENTILATION RATE
- 5.3 CONTINUOUS MECHANICAL EXHAUST
- 5.3.1 CONTROL AND OPERATION
- 5.3.2 VENTILATION RATE
- 5.4 AIRFLOW MEASUREMENT

TABLE 5.1 - Intermittent Local Ventilation Exhaust Airflow Rates

Application	Airflow	Notes
Kitchen	100 cfm	Vented range hood (including appliance-range combinations) required if exhaust fan flow rate is less than 5 air changes per hour
Bathroom	50 cfm	

TABLE 5.2 - Continuous Local Ventilation Exhaust Airflow Rates

Application	Airflow	Notes
Kitchen	5 air changes per hour	Based on kitchen volume
Bathroom	20 cfm	

This chart came out of ASHRAE Standard 62.2-2012 User's Manual

Local Exhaust
5.1

- Local mechanical exhaust shall be installed in each kitchen and bathroom
  - This part of the standard shall be met in either of the following two ways
    a) Intermittent mechanical exhaust system
    b) Continuous mechanical exhaust system

Local Exhaust
5.1

- The standard defines a kitchen and a bathroom as follows:
  a) A kitchen as any room that contains cooking appliances
  b) A bathroom are rooms containing bathtubs, showers, spa or other source that produce moisture. Note a room that only has a toilet and a sink is not required to have mechanical exhaust

Example Local Exhaust

5a Local Exhaust Required for Half Bath

Q: The house I am working in has two and a half baths. Is local exhaust required for the half bath?

A: No. Local exhaust is required only for bathrooms with a tub, shower or other moisture producing sources.

Local Exhaust
5.1

- Type of local exhaust systems
  - Ceiling exhaust fan
  - Interior or exterior mounted exhaust fan
  - Vented range hood/combination hood /microwave
  - Exhaust grill from a HRV/ERV
  - Remote mounted inline fan
  - Consideration must be taken if the fan is labeled for use in cooking areas . The label or printing might say " Not for use in cooking areas" this area is typically defined by a set of lines extended at a 45 degree angle outward and upward from the cook top

Surface mounted exhaust fan

Combination Ventilation /Microwave

Exhaust grill in kitchen/bath from HRV/ERV or Inline Fan

Example Local Exhaust

5-8 Acceptable Ceiling Fan for Cooking Area

Q: I purchased a ceiling fan, planning to use it to provide intermittent exhaust in a kitchen. I don't see a label indicating that it is approved for use in a cooking area. How do I know if it is acceptable?

A: Check the packaging for a label or printing that says, **"Not for use in cooking areas,"** or something similar. There is no labeling that says a fan is approved for use in a cooking area, only if it is not approved.

Intermittent Local Exhaust 5.2

- The airflow requirement for intermittent ventilation is
  - This is from table 5.1 in the ASHREA 62.2 2010 users guide-
  - Kitchen- 100 cfm- vented range hood (including appliance-range hood combinations) required if exhaust fan flow rate is less then 5 kitchen air changes per hour
  - Bathroom – 50 cfm

Intermittent Local Exhaust
5.2

- The standard requires that intermittent exhaust fans be designed to be operated by the occupant
- This means the control be accessible and obvious

Control and Operation
5.2.1

- Control and operation
  - The choice of the control is left up to the designer.
  - Common controls include
    - Manual switch, multi speed controls, delay shutoff function, humidistat, occupant sensors, combine switching

Ventilation Rate
5.2.2

- 5.2.2 Ventilation Rate
  - Simply meet table 5.1
  - The kitchen exhaust requirement can be met with
    - Ceiling exhaust fan
    - Interior or exterior mounted exhaust fan
    - Vented range hood/combination hood /microwave
    - Exhaust grill from a HRV/ERV or inline fan
    - But not recirculating range hood

Continuous Mechanical Exhaust 5.3

- The standard allows the designer to install a local exhaust system that operates continuously and automatically
- The continuously local exhaust may be a part of the whole building ventilation system

Control and Operation
5.3.1

- The system shall be designed to operate during all occupied hours.
- Readily assessable override control must be provided to the occupant

Ventilation Rate
5.3.2

- This section simply requires the ventilation rate be met by airflow rate shown on table 5.2 or
  - Kitchen needs 5 air changes per hour based on kitchen volume
  - Bathroom needs 20 cfm

Ventilation Rate
5.3.2

- The minimum delivered ventilation shall be at least the amount indicated in table 5.2 during each hour of operation

Airflow Measurement
5.4

- To make sure that the standard is met, it is required that the installed fan be measured for airflow. The measurement must be made using a flow hood, flow grid or airflow measuring device

Airflow Measurement
5.4

- Exception: If the airflow rating meets or exceeds the required airflow when measured at 0.25” w.g. and meets the prescriptive requirements of table 5.3 in the standard or manufacturer’s design criteria
- The Home Ventilation Institute, HVI web site has listing of hundred of products and there performance (www.hvi.org). Check it out

Section 6 Other Requirements

Index for Section 6

- 6.1 ADJACENT SPACES
- 6.2 INSTRUCTIONS AND LABELING
- 6.3 CLOTHES DRYERS
- 6.4 COMBUSTION AND SOLID FUEL BURNING APPLIANCES
- 6.5 AIRTIGHTNESS REQUIREMENTS
- 6.5.1 GARAGES
- 6.5.2 SPACE – CONDITIONING SYSTEM DUCTS

Index for Section 6

- 6.6 VENTILATION OPENING AREA
- 6.6.1 HABITABLE SPACES
- 6.2.2 TOILETS AND UTILITY ROOMS
- 6.7 MINIMUM FILTRATION
- 6.8 AIR INLETS
- 6.8.1 VENTILATION OPENING

Adjacent Spaces
6.1

- The intent of the standard is to use air from outside for ventilation
- Measurements shall be taken to minimize air movement across the building shell separating dwelling unit, and to dwelling unit garages, unconditioned crawl spaces, and unconditioned attic
- Supply and balanced ventilation system shall provide ventilation air from the outdoors

Instructions and Labeling
6.2

- Information (instructions) on what the ventilation system is supposed to do and how to operate it shall be provided to the owner and occupant.
- Controls shall be labeled as to their function, no specific wording is mandated

Clothes Dryers
6.3

- Clothes dryers shall be exhausted directly to the outdoors

Combustion and Solid-fuel Burning Appliances
6.4

- This part of the standard discuses atmospherically (natural draft) appliances and prevention back-drafting
- Proper appliance installation according to the code or standard and manufactures installation should provide a good margin of safety for protection against back-drafting

Combustion and Solid-fuel Burning Appliances
6.4

- Typical vented combustion appliances include, furnaces, boilers, water heaters, gas or wood fire places, and wood stoves
- These system must be provide with adequate combustion and ventilation air and vented in accordance with manufactures installation instructions.

Combustion air

Natural draft 70% efficient

FIRE PLACES

Backdrafting Water Heater

CAZ Testing

- Acceptable (BPI or equivalent) methods of Combustion Air Zone (CAZ) testing need to used when natural draft equipment is with in the stucture

Combustion and Solid-fuel Burning Appliances
6.4

- This calculation is applicable when atmospherically vented combustion or a solid fuel burning appliance is located with in the pressure boundary.
- When the net flow of the two largest exhaust fans exceeds 15 cfm/100sq ft or (.15 X sq ft) of occupiable space the following needs to occur:
  - The net exhaust flow needs to reduced
  - Outdoor make up air is needed to be supplied to house
  - Combination of both

Exhaust only

Air Tightness Requirements
6.5.1 Garages

- Garages, attached to the house
- Prevent migration of contaminates entering the house
- Air sealing needs to occur at common air leakage areas
- Doors between garages and occupiable spaces shall be gasketed

Air Tightness Requirements 6.5.2 Space –Conditioning system ducts

- All air distribution joints outside the pressure boundary shall be sealed
- Air distribution systems shall not serve both occupiable spaces and garage area
- If duct work is out side of the pressure boundary it can not leak more then of 6% of total airflow when measured at .1 wc (25pa)

Air Tightness Requirements 6.5.2 Space –Conditioning system ducts

- Leakage tests must be in accordance with California Title 24 (2001) or equivalent.
- Method D of ANSI/ASTM E1554 is specially cited as an equivalent test procedure

Minimum Filtration
6.7

- Merv rating of 6 or better needs to be used for mechanical systems that supply air to occupiable spaces
- Outdoor air needs to be filtered
- This filtration requirement applies to air handling (heating and cooling) systems with 10 feet of duct work or more

Air Inlets
6.8

- When the ventilation system is designed with an air inlets, they shall not be any closer then 10 feet known source of contamination. Some of those source include
  - Exhaust hoods
  - Stack
  - Chimneys
  - Were vehicles might idle for a significant time
  - Barbeque grills
  - Vents from combustion appliances

Section 7 Air-Moving Equipment

Air Moving Equipment
7.1

- 7.1 Selection and Installation; There is several rating and standards that 7.1 refers to, they look at sound, performance, air flow and aerodynamics of air moving equipment
- You must review and follow manufacture's installation instruction

Sound Rating for Fans
7.2

- The sound requirement applies to surface mounted fans
- An exception to the sound requirement would be these type of systems
  - HRV/ERVS
  - Inline fans
  - Remote fans
  - HVAC air handlers

  These system need to have at least 4 feet of ductwork between the fan and the intake grille

Whole-Building or Continuous Ventilation Fans 7.2.1

- These fans shall be rated for sound at a maximum of 1.0 Sone

Intermittent Local Exhaust Fans 7.2.2

- These fans shall be rated for sound at a maximum of 3.0 Sone, unless their maximum rated airflow exceeds 400 cfm

Multi-branch Exhaust Ducting 7.3

- If there is more then one exhaust fan that uses common duct work, back draft dampers need to be installed to prevent recirculation

APPENDIX A
EXISISTING BUILDINGS

APPENDIX A
EXISISTING BUILDINGS

- This is an alternative method for existing buildings to meet 62.2
- In general, the whole-building ventilation rate, as determined from section 4.1 of the standard , is increased to compensate when it is impractical to provide kitchen or bathroom exhaust equipment

APPENDIX A
EXISISTING BUILDINGS

- SECTION A2 Whole-Building Mechanical Ventilation Rate
- Two points
  1. Increase the whole building ventilation when local can’t be meet
  2. If building is leaky (must be measured) a reduction in ventilation may occur

Initial Room Airflow Deficit
A 3.1

- This number is determined by comparing the exhaust flow of existing equipment and requirement of table 5.1
  - The measured or rated flow

Example

A-C Determining the Initial Room Airflow Deficit

Q: An existing home has two bathrooms and a kitchen. One bathroom has an exhaust fan which has a measured airflow of 37 cfm, but no open able windows. The other bathroom has no fan but does have a open able window. The kitchen has an exhaust fan with a measured airflow of 62 cfm, but no open able window. What is the Initial Room Airflow deficit for each room?

A: For the bathrooms, Table 5.1 requires an exhaust capacity of 50 cfm. 100 cfm is required for the kitchen. The Initial Room Airflow Deficit is the required airflow from Table 5.1 minus the airflow of the existing fan. For the first bathroom, this value is 13 cfm (50 cfm – 37 cfm). For the other bathroom, the Initial Room Airflow Deficit is 50 cfm (50-0). For the kitchen it is 38 cfm (100-62). The open able window in bathroom two is not included in determining the Initial Room Airflow Deficit, but will be used later for the Window Opening Credit.

Window Opening Credit
A 3.2

- One credit per room (Kitchen or Bathroom)
- 20 cfm reduction per room (Kitchen or Bathroom) if it has an openable window

Required Additional Airflow
A 3.2

- The final step in the calculating the adjusted mechanical ventilation rate is to add the Initial Room Airflow Deficit for each kitchen or bathroom, subtract 20 cfm for each of those rooms with an openable window, then divide that total by four. Then go to step 4 in the next slide

APPENDIX A
EXISISTING BUILDINGS

1. Add initial room air deficit for applicable kitchens and bathrooms
2. Subtract 20 cfm for each kitchen and bathroom with an open able window
3. Divide the total by four. The results is the required additional airflow
4. Add to the whole-building mechanical ventilation rate determined in Section 4.1
5. Deduct the infiltration credit determined in section 4.1.3

Thank you for your time

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